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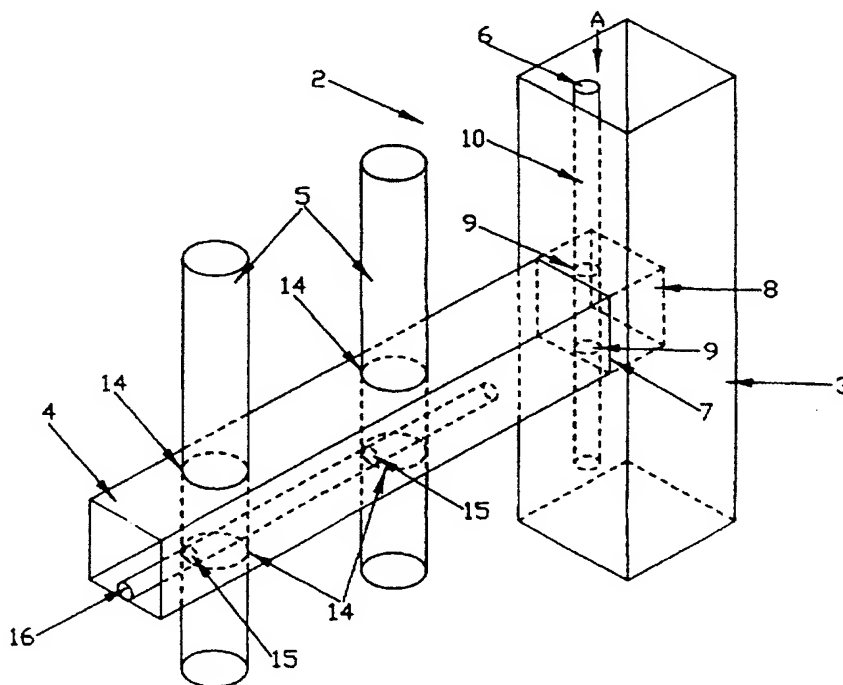
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(21) International Application Number: PCT/NZ96/00100 (22) International Filing Date: 20 September 1996 (20.09.96) (30) Priority Data: 280070 21 September 1995 (21.09.95) NZ (71) Applicant (for all designated States except US): WARNER & WARNER LIMITED [NZ/NZ]; 541 Johns Road, Harewood, Christchurch (NZ). (72) Inventor; and (75) Inventor/Applicant (for US only): WARNER, Kenneth, Walter [NZ/NZ]; 541 Johns Road, Harewood, Christchurch (NZ). (74) Agent: BUCHANAN, Elspeth, Victoria; P.L. Berry & Associates, P.O. Box 1250, Christchurch (NZ).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report.

(54) Title: FENCE CONSTRUCTION



(57) Abstract

A fence construction consisting of one or more rails (4) secured between spaced posts (3), with a plurality of spaced cross members (5) secured to the or each rail (4); each cross member (5) is secured to the or each rail (4) by means of a rigid locking rod (16) which extends along the interior of the corresponding rail (4) and passes through a hole (15) formed through each cross member (5).

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TITLE: FENCE CONSTRUCTIONTECHNICAL FIELD

The present invention relates to fencing and related structures. More particularly, although not exclusively, the present invention relates to fences which incorporate support posts, rails, and cross-members. The present invention also relates to construction systems for fences, balustrades and other types of intersecting constructions.

To the present time, fence installations have conventionally been either assembled *in situ* or assembled and transported in prefabricated form to a construction site. Where fences are transported in a preassembled form, freight costs based on cargo volume can be substantially increased by the preassembled dimensions of the assembled fence structure. Such cost disadvantages are exacerbated in export situations, where assembled fence units or similar structures may need to be freighted over long distances.

Accordingly, a preferred method is to construct the fence on-site thereby resulting in savings in freight costs by transporting the fencing components in a compact form. Clearly, fencing members such as posts, rails and cross-members can be more efficiently packaged and transported if they are packed lengthwise in a compact bundle.

Post and rail fence structures may be assembled by methods known in the art including welding, riveting or some other mechanical means. Such techniques can be time consuming and require expertise on-site which may not be readily available and may involve added expense and effort. Also, welding or other fixing techniques may damage, mark or disfigure fencing members which may be, for example, powder-coated or painted at the factory prior to being shipped disassembled. Accordingly, there exists a need for a fence construction technique which is simple, does not physically change, alter the appearance of, or disfigure the fencing members and provides a secure and rigid construction.

BACKGROUND ART

NZ patent no. 210216 discloses a post and rail fence structure which can be assembled on site from prefabricated components. However, in this design, the rails are secured to the posts only by frictional contact between the rails and a metal insert into the posts, and the resulting structure is neither
5 strong nor robust.

US patent 5307598 discloses a system of securing a single horizontal member to a vertical post using locking pins, but the system is suitable only for use with a short post where the locking pins can be inserted through the open
10 top of the post, and is not suitable for applications where either a long post and/or multiple rails are required.

DISCLOSURE OF INVENTION

It is therefore an object of the present invention to provide a fencing
15 system which is compact and suitable for shipping in prefabricated form, and which can be rapidly and easily erected on site by comparatively unskilled labour. The fence of the present invention is suitable for many applications, including ornamental fencing, security fencing, pool fencing and balustrading.

The present invention provides a fence construction which includes: at
20 least one rail to which a plurality of spaced cross-members is securable; characterised in that said rail provides a plurality of holes each adapted to receive one cross-member; each said cross-member having a hole therethrough, said hole being located on said cross-member such that when said cross-member is assembled onto said rail, said hole is located within said rail; and means for
25 securing each cross-member to said rail, said securing means comprising a first rigid locking rod which in use extends along the interior of said rail and passes through the hole of each cross-member, so as to prevent removal of said cross-members from said rail.

Preferably, said fence construction also includes a pair of spaced posts,

one of which is securable to each end of the or each said rail. The means of securing the end of the rail to the adjacent post may be, for example, a bracket connected between the end of the rail and the post or by inserting the end of the rail through a hole formed in the adjacent side of the post, and then locking the
5 rail to the post by inserting a second locking rod which passes through a hole formed in the end of the rail in the interior of the post.

In a majority of fence systems, the posts would be parallel and substantially vertical, the or each rail substantially horizontal, and the cross-members uprights which are substantially vertical, parallel to the posts.
10 However, the fence construction of the present invention is not limited to these particular orientations and could in fact be used for a variety of different geometrical arrangements:- for example, the posts could be substantially horizontal or at an angle to the vertical and the cross-members and rails also could be at any desired angle to the posts and to each other.

15 If desired, the construction may include more than one first locking rod and/or more than one second locking rod.

Each cross-member may terminate at a rail or it may pass completely through that rail and extend on both sides of the rail.

In addition to said first locking rod, each cross-member may be secured
20 to the or each rail by a grommet which consists of a sleeve passing over the exterior surface of the cross-member and formed with an enlarged diameter lip at one end. Spaced a short distance below said lip are a pair of non-return lugs, the distance between the underside of said lip and the upper surface of said non-return lugs being slightly greater than the thickness of the rail to which the
25 cross-member is to be secured. Each grommet has a hole therethrough, corresponding in size and location to the hole through the cross-member. In use, the cross-member with the grommet located on it is inserted into the hole in the rail, depressing the non-return lugs, until the non-return lugs lie below the surface of the rail and spring outwards to prevent withdrawal of the grommet

from the rail, with the lip of the grommet resting on the outer surface of the rail, around said hole. The first locking rod extends through both the hole in the grommet and the corresponding hole in the cross-member, to lock both grommet and cross-member to the rail.

5

BRIEF DESCRIPTION OF THE DRAWINGS

By way of example only, preferred embodiments of the present invention are described in detail, with reference to the accompanying drawings, in which:-

10 Fig. 1 is a schematic isometric view of part of a fence in accordance with the present invention;

Fig. 2 is a view of part of Fig. 1 in the direction of arrow A;

Fig. 3 is a longitudinal section through a post and rail, showing an alternative connection;

15 Fig. 4 is a schematic isometric view of an alternative upright/rail connection;

Fig. 5 is a side view of a securing grommet; and

Fig. 6 is a longitudinal section showing the grommet of Fig. 5 in place in a fence.

20

BEST MODE OF CARRYING OUT THE INVENTION

Referring to Figs. 1 and 2, a fence 2 in accordance with the present invention comprises at least two spaced posts 3 (only one of which is shown), one at each end of the fence, at least one rail 4, and a plurality of spaced cross-members in the form of uprights 5, two of which are shown.

25

For a majority of fences, the posts and uprights would be vertical or substantially so, and the rail or rails horizontal, as shown in Fig. 1. However, it will be appreciated at the posts, rails, and uprights could be connected in a wide variety of different orientations. The posts, rails and uprights may have

any desired cross-sectional shape.

Each post 3 is hollow or (if solid) has channels formed in it to admit the end of the rail 4 and a locking rod 16. Usually, a hollow post 3 would be preferred, for lightness and economy of materials.

5 The post 3 has an aperture 7 cut in the side facing the rail 4; the aperture 7 is slightly larger than the external measurements of the rail 4, so that the end of the rail 4 is an easy sliding fit therein.

 The end 8 of the rail which is inserted into the aperture 7 has two aligned holes 9 formed in its upper and lower faces, to permit a locking rod 10 to be inserted therethrough, locking the rail to the post.

 The locking rod 10 may be used to secure any number of parallel rails in the same manner, and normally extends the full length of the post 3.

 The open upper end of the post 3 is closed by a removable cap (not shown). The lower end of the post may be secured to a base-plate (not shown) 15 which can be bolted to a floor or other base, or may be dug into the ground or other supporting surface.

 To assist the engagement of the locking rod 10 with the holes 9, a guide tube 12 (Fig. 2 only) may be used. The guide tube 12 has a diameter slightly greater than that of the locking rod, and is mounted inside the post 3 by 20 means of a plurality of spaced locating flanges 13 which contact the inner surfaces of the post 3 to support the tube 12 in the required alignment with the holes 9. The locking rod 10 thus can be passed down the guide tube 12, through the first set of holes 9, then if necessary through a further guide tube 12 and then through further holes 9 and so on.

25 Reverting to Fig. 1, the rail 4 is formed with a series of spaced sets of aligned holes 14, sized to receive an upright 5 as an easy sliding fit therethrough. Each upright 5 has a pair of aligned holes 15 formed in its walls, said holes 15 being positioned so as to lie in the interior of the rail 4 when the upright 5 is correctly positioned in the holes 14.

To lock the uprights 5 to the rail 4, a locking rod 16 is pushed through the holes 15. A guide tube of the type shown in Fig. 2 may be used inside the rail 4 in the same manner as inside the post 3, if preferred. If the posts and rails are solid, then guide tubes are not required because the access channels
5 formed in the interior of the post or rail guide the locking rods.

Preferably, to reduce play between the component parts of the fence, the holes 9, 15 in the rail and uprights respectively are located so that the locking rods 10, 16 lie close to an interior surface of the post or rail respectively. For the same purpose, multiple spaced parallel locking rods 10,
10 16, can be used, with additional holes being formed in the rails and uprights respectively.

Fig. 1 shows only a single rail 4 connected to a single post 3. However, it will be appreciated that multiple rails may be connected to each post. If two or more rails are connected to the same post and the same vertical level,
15 it may be necessary to mitre the corners of the rails which lie in the interior of the post.

Fig. 3 shows an alternative method of securing the rail 4 to the post 3. The end of the rail 4 is blanked off with a U-cross-section bracket 15 which is secured to the rail 4 by screws or bolts 16 or other suitable means (eg. gluing).
20 The bracket 15 is then secured to the abutted wall of the post 3 by further screws or bolts 17.

Fig. 4 shows an alternative method of securing the uprights 5 to the rail 4 when the uprights terminate at the rail. Instead of forming holes in the uprights through which the locking rod 16 passes, the end 18 of each upright 5
25 is bent over into a loop or hook, through which the locking rod 16 passes to secure the uprights to the rail.

A further embodiment is shown in Figs. 5 and 6. This embodiment uses a grommet 20 to secure the upright 5 to the rail 4. The grommet 20 gives a particularly neat finish and also reduces the chance of scratching of the

exterior finish of the posts and rails during assembly.

5 The grommet 20 comprises a sleeve 21 with a rolled lip 22 at one end. The sleeve 21 is a sliding fit over an upright 5. The grommet is formed with a pair of opposed non-return locking lugs 23, which can flex inwards under compression but which are sufficiently elastic to spring outwards to the position of Fig. 5 and 6 when the compression is removed. The lugs 23 are located below the lip 22 by a distance approximately equal to the thickness of the wall of the rail 4.

10 Each grommet 20 is formed with a pair of holes 25 corresponding in size and position to the holes 15 in the upright 5.

15 To secure an upright 5 to the rail 4, a grommet 20 is slid over the upright 5 until the holes 25 are aligned with the holes 15. As the upright and grommet pass through the hole 14 in the rail 4, the lugs 23 are depressed inwards, and then spring back into position (as shown in Fig. 6) beneath the upper surface of the rail 4, preventing the grommet from being withdrawn from the rail. The locking rod 16 is then passed through the holes 25 and 15 to lock the upright 5 and grommet 20 to the rail 4.

20 It is envisaged that the grommets 20, could be made of a tough resilient plastics material. The posts, rails and uprights can be made of any suitable material eg. metal, fibreglass.

INDUSTRIAL APPLICABILITY

25 The construction described herein is particularly suitable for security fences for residential and commercial properties and pool fences. The construction technique is also suitable for use in a large number of contemporary fence designs as the locking means is substantially concealed from view. Further, the construction is sufficiently compact so that the dimensions of the members constituting the fence are not governed or constrained by the dimensions of the locking rod itself.

It is envisaged that a prefabricated fence may be manufactured in component form and shipped unassembled, whereupon assembly on-site is effected without the need for welding, riveting or other apparatus. Further, the fence may be disassembled without damaging its constituent components.

5

CLAIMS:

1. A fence construction which includes: at least one rail to which a plurality of spaced cross-members is securable; characterised in that said rail provides a plurality of holes each adapted to receive one cross-member; each
5 said cross-member having a hole therethrough, said hole being located on said cross-member such that when said cross-member is assembled onto said rail, said hole is located within said rail; and means for securing each cross-member to said rail, said securing means comprising a first rigid locking rod which in use extends along the interior of said rail and passes through the hole of each
10 cross-member, so as to prevent removal of said cross-members from said rail.
2. The fence construction as claimed in claim 1 wherein said fence construction further includes a pair of spaced posts, one of which is securable to each end of the or each said rail.
- 15 3. The fence construction as claimed in claim 2, wherein each said post is securable to the or each said rail by means of a bracket one part of which is securable to said post and the other part of which is securable to said rail.
- 20 4. The fence construction as claimed in claim 2, wherein each said post is securable to the or each said rail by means of a second rigid locking rod which in use extends along the interior of said post and passes through a first hole formed through the adjacent end of said rail, which extends into the interior of said post through a hole in the side of said post.
- 25 5. The fence construction as claimed in claim 4 wherein each said post has a plurality of parallel rails securable thereto by means of a single locking rod.

6. The fence construction as claimed in claim 4 or claim 5 further comprising at least one additional second locking rod parallel to said second locking rod and in use extending through a second hole formed through the adjacent end of the or each said rail.

5

7. The fence construction as claimed in any one of the preceding claims, further comprising at least one additional first locking rod parallel to said first locking rod and in use extending through a second hole formed through each cross-member.

10

8. The fence construction as claimed in any one of the preceding claims wherein the or each said rail is solid in cross-section except for a longitudinal channel to admit the or each said first locking rod.

15

9. The fence construction as claimed in any one of the preceding claims where the or each said post is solid in cross-section except for a longitudinal channel to admit the or each said second locking rod.

20

10. The fence construction as claimed in any one of claims 1-7 and 9 wherein the or each said rail is hollow.

11. The fence construction as claimed in any one of claims 1-8 and 10 wherein the or each said post is hollow.

25

12. The fence construction as claimed in claim 10 further comprising one or more guide tubes each located in the or each said rail so as to guide the or each said first locking rod to said corresponding holes in the cross-members.

13. The fence construction as claimed in claim 11 further comprising one

or more guide tubes each located in each said post so as to guide the or each said second locking rod to said corresponding hole in the or each said rail.

14. The fence construction as claimed in any one of the preceding claims
5 wherein said means for securing each cross-member to the or each said rail further includes a grommet, which comprises: a hollow sleeve dimensioned to be a sliding fit upon a cross-member and having a hole therethrough corresponding to the hole through the cross-member; one end of said sleeve being provided with a lip of enlarged diameter; and one or more non-return lugs
10 secured to the exterior of said sleeve a distance away from said lip slightly greater than the thickness of the wall of the rail.

15. The fence construction as claimed in any one of the preceding claims wherein each of said plurality of holes through the or each rail is a through hole.
15

16. The fence construction as claimed in any one of the claims 1-13 wherein each of said plurality of holes through the or each rail extends through only one wall of said rail.

20 17. The fence construction as claimed in claim 16 wherein each cross-member securable to said rail has the end thereof which lies inside said rail in use formed into a loop, said loop constituting the hole through said cross-member for engagement with said first locking rod.

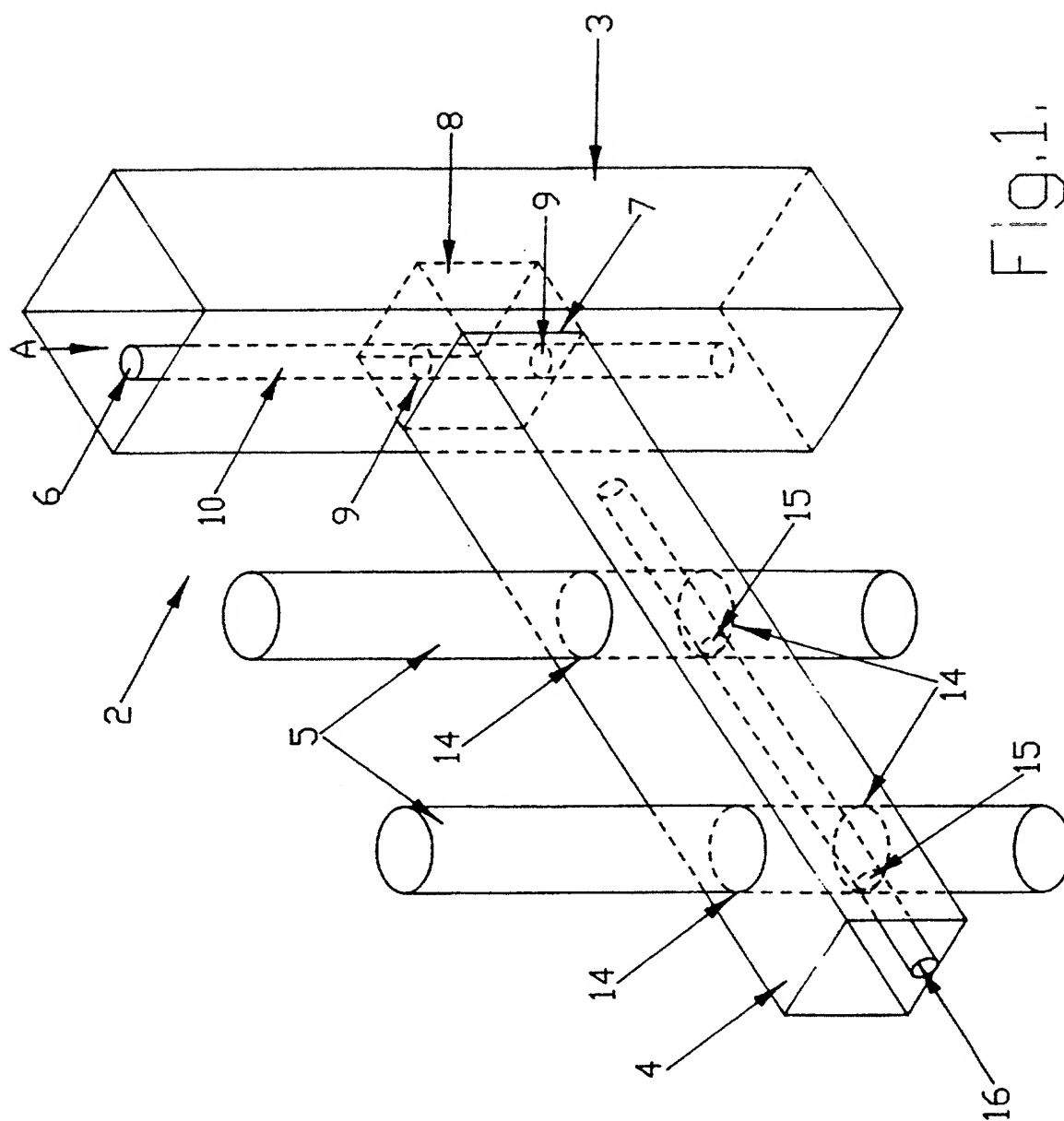
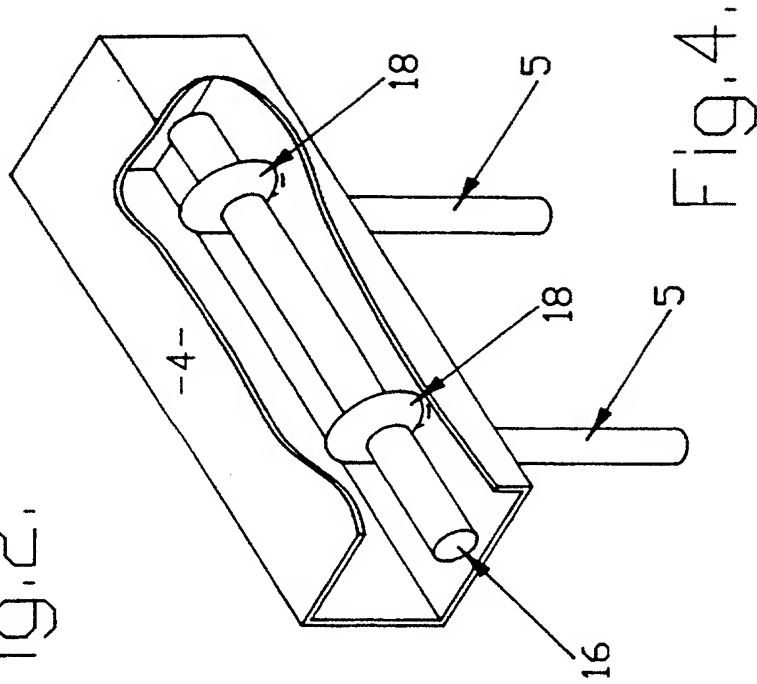
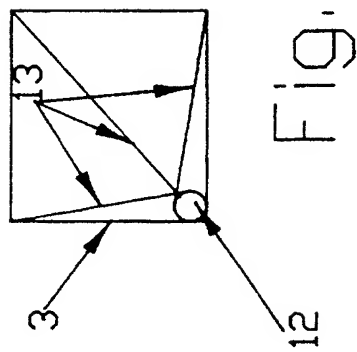
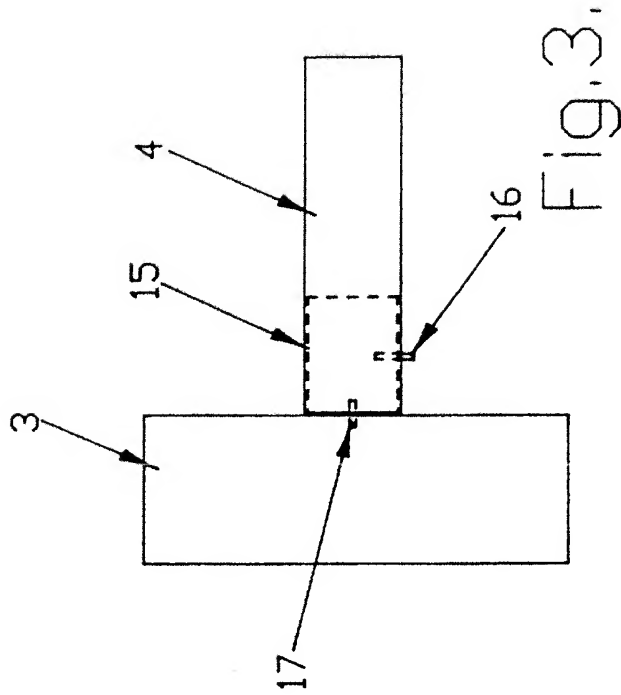


Fig. 1.



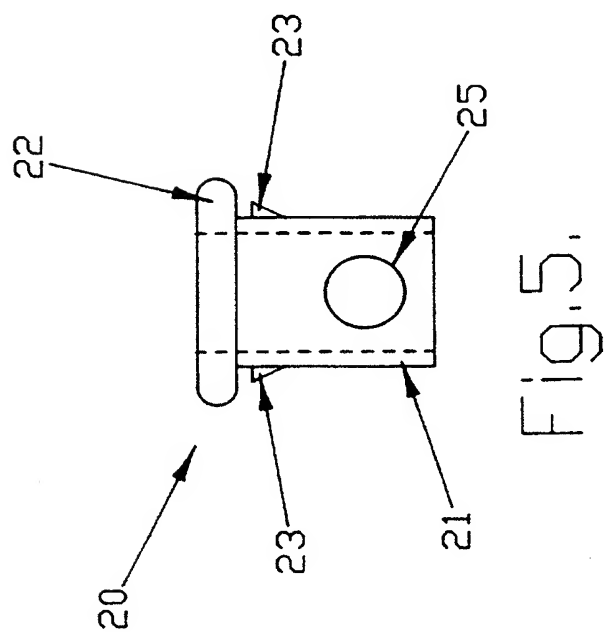


Fig. 5.

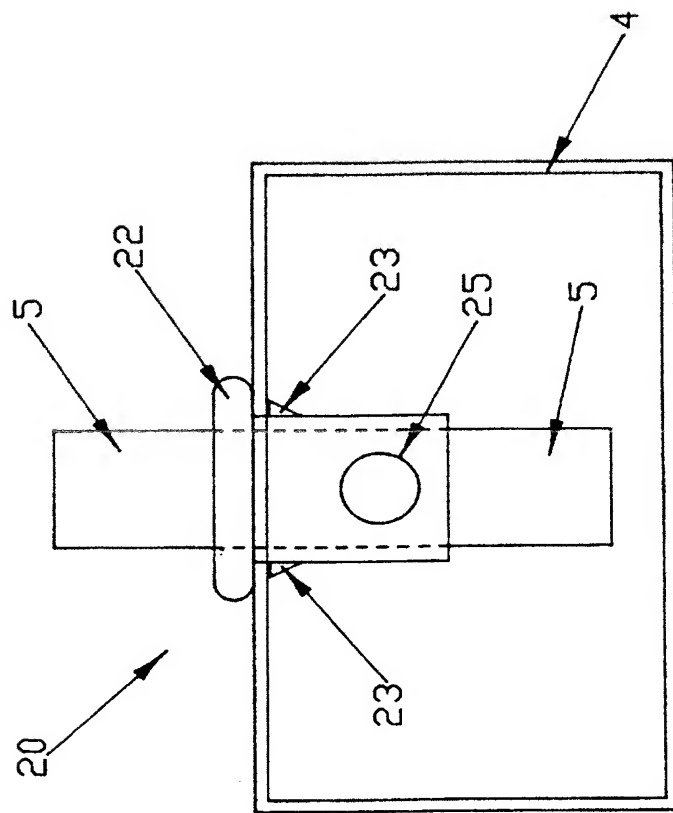


Fig. 6.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ 96/00100

A. CLASSIFICATION OF SUBJECT MATTER				
Int Cl ⁶ : E04F 11/18, E04H 17/14				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC: E04F 11/18, E04H 17/14				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DERWENT, JAPIO				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
A	AU 84761/91 B (624317) (ULLRICH ALUMINIUM CO LTD) 4 June 1992			
A	US 3892056 A (MANN) 1 July 1975			
A	US 3921960 A (BRIGHT) 25 November 1975			
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex				
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Date of the actual completion of the international search 22 November 1996		Date of mailing of the international search report <div style="font-size: 1.2em; margin-top: 10px;">5 DEC 1996</div>		
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (06) 285 3929		Authorized officer SUE THOMAS Telephone No.: (06) 283 2454		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/NZ 96/00100

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	3892056	US	3892387
		US	398809
US	3921960		
AU	624317		
END OF ANNEX			